



ISLAMIC UNIVERSITY OF TECHNOLOGY

Department of Computer Science and Engineering (CSE)

Course Outline and Course Plan



Name of the Teacher	S. M. Sabit Bananee	Position	Lecturer
Department	CSE	Programme	B.Sc. Eng. in SWE
Course Code	CSE 4501	Course Title	Operating Systems
Academic Year	2021-22	Semester	Winter
Contact Hours	3.0	Credit Hours	3.0
Text books and Reference books	1. <i>Operating Systems Concepts, 9TH Ed</i> 2. <i>Understanding Operating System, 6TH Ed</i> 3. <i>Operating Systems: A Spiral Approach</i> 4. <i>Operating Systems: Internal Design and Principles, Pearson, 8th Ed</i> 5. <i>Modern Operating Systems, 4th Ed</i>	Authors of the books	1. Silberschatz, A., Galvin, A., Gagne, 2. McHoes, A., Flynn, I. 3. Elmasri, R., Carrick, A., Levine, D. 4. William Stallings 5. Tanenbaum A. S.
Prerequisites (If any)	1. CSE 4303: Data Structures 2. CSE 4305: Computer Organization and Architecture		
Course Homepage	https://classroom.google.com/c/NTI2MTg5OTE4NTg0		
Teaching Methods/ Approaches	<input type="checkbox"/> Lecture✓ <input type="checkbox"/> Group discussion✓ <input type="checkbox"/> Demonstration <input type="checkbox"/> Problem solving✓ <input type="checkbox"/> Project <input type="checkbox"/> Others: Tutorial classes✓		
Teaching aids	Multi-media	OHP	Board and Marker✓ Others

Course Assessment Method								
Attendance (10%)	Quiz 30% of Total Marks (Best 3 out of 4)						Mid Semester (25%)	Semester Final (35%)
	1 st Quiz	2 nd Quiz	3 rd Quiz	4 th Quiz	Others		Week/Date	Week/Date
	Week/Date	Week/Date	Week/Date	Week/Date	Assignment	Homework		
	4 th Week	6 th Week	10 th Week	13 th Week	2 Assignments	Will be given time to time	As per schedule of IUT	As per schedule of IUT

Grading Policy						
Marks out of 100	Letter Grade	Grade Point	Marks out of 100	Letter Grade	Grade Point	
80 - 100	A+	4.00	55 - 59	B-	2.75	
75 - 79	A	3.75	50 - 54	C+	2.50	
70 - 74	A-	3.50	45 - 49	C	2.25	
65 - 69	B+	3.25	40 - 44	D	2.00	
60 - 64	B	3.00	00 - 39	F	0.00	

Class Schedule	
Wednesday	09:15 AM – 10:30 AM
Thursday	03:45 PM – 05:00 PM

Course Contents

Operating System Overview, Unix / Windows History, POSIX, GNU / GLP, Homebrew Club, Open-Source OS Linux. Process Description and Control 2 and 5 states process models, Process Control Structures, Modes of Execution, Process Switching Threads User-Level and Kernel-Level Threads, Performance on Multicore, Linux Process and Thread Management Concurrency: Mutual Exclusion and Synchronization Race Condition, Interrupt Disabling, Producer/Consumer Problem, Monitors, Message Passing Concurrency: Deadlock and Starvation Principles of Deadlock, Hold and Wait, Circular wait, Deadlock Detection Algorithm Memory Management Relocation, Protection, Memory Partitioning, Paging, Segmentation Scheduling Types of Processor Scheduling, Scheduling Algorithms, Traditional UNIX Scheduling I/O Management DMA, I/O Buffering, Disk Scheduling, UNIX SVR4 I/O, Linux I/O OS Security & Threats, Threats, Attacks, and Assets, Malicious Software, Viruses, Worms, and Bots, Rootkits

Course Objectives

After completing the course, the student must be able to:

- ✓ Explain what operating systems are, what they do, and how they are designed and constructed;
- ✓ Discuss various methods for process management and CPU scheduling;
- ✓ Explain the principals involved in the internal algorithms and structures of primary and secondary memory management.
- ✓ Identify and discuss the protection mechanisms that may be provided by operating systems.

Mapping with CO, PO and Bloom's Taxonomy

CO No.	Course Outcomes (CO) Statement	levels of Bloom's Taxonomy	Matching with Program Outcome (PO)
CO1	Describe the evolution, types, structure and functions of operating systems	C2	PO1, PO2
CO2	Explain techniques involved in process, memory, device and file management	C2	PO2
CO3	Describe security and protection measures used in operating systems	C2	PO3
CO4	Execute Linux basic commands and shell scripts	C3	PO2
CO5	Implement processor scheduling, synchronization, deadlocks and disk allocation algorithms for a given scenario	C3	PO1, PO2

Weekly plan for course content and mapping with CO

Weeks	Topics	COs
1	Class orientation Discussion of course goals, expected outcomes, course policies and grading system	---
2	Introduction to Operating Systems	CO1
3 & 4	Computer System Structures	CO1, CO2
5	Process Management	CO2, CO3
6 & 7	CPU Scheduling	CO5

Program Outcomes	
PO 1	Engineering Knowledge: Apply knowledge of mathematics, natural science, engineering fundamentals and system fundamentals, software development, networking & communication, and information assurance & security to the solution of complex engineering problems in computer science and engineering.
PO 2	Problem Analysis: Ability to identify, formulate and analyze complex Computer Science and Engineering problems in the areas of hardware, software, theoretical Computer Science and applications to reach significant conclusions by applying Mathematics, Natural sciences, Computer Science and Engineering principles.
PO 3	Design/ Development of Solutions: Design solutions for complex computer science and engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO 4	Investigation: Ability to use research-based knowledge and research methods to perform literature survey, design experiments for complex problems in designing, developing and maintaining a computing system, collect data from the experimental outcome, analyze and interpret valid/interesting patterns and conclusions from the data points.
PO 5	Modern Tool Usage: Ability to create, select and apply state of the art tools and techniques in designing, developing and testing a computing system or its component.
PO 6	The Engineer and Society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice in system development and solutions to complex engineering problems related to system fundamentals, software development, networking & communication, and information assurance & security.
PO 7	Environment and Sustainability: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice in system development and solutions to complex engineering problems related to system fundamentals, software development, networking & communication, and information assurance & security.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of computer science and engineering practice.
PO 9	Individual Work and Teamwork: Ability to function as an individual and as a team player or leader in multidisciplinary teams and strive towards achieving a common goal .
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project Management and Finance: Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

K

Table 4.1: Knowledge Profile

	Attribute
K1	A systematic, theory-based understanding of the natural sciences applicable to the discipline
K2	Conceptually based mathematics, numerical analysis, statistics and the formal aspects of computer and information science to support analysis and modeling applicable to the discipline
K3	A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline
K4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline
K5	Knowledge that supports engineering design in a practice area
K6	Knowledge of engineering practice (technology) in the practice areas in the engineering discipline
K7	Comprehension of the role of engineering in society and identified issues in engineering practice in the discipline: ethics and the engineer's professional responsibility to public safety; the impacts of engineering activity; economic, social, cultural, environmental and sustainability
K8	Engagement with selected knowledge in the research literature of the discipline

P

Table 4.2: Range of Complex Engineering Problem Solving

Attribute	Complex Engineering Problems have characteristic P1 and some or all of P2 to P7:
Depth of knowledge required	P1: Cannot be resolved without in-depth engineering knowledge at the level of one or more of K3, K4, K5, K6 or K8 which allows a fundamentals-based, first principles analytical approach
Range of conflicting requirements	P2: Involve wide-ranging or conflicting technical, engineering and other issues
Depth of analysis required	P3: Have no obvious solution and require abstract thinking, originality in analysis to formulate suitable models
Familiarity of issues	P4: Involve infrequently encountered issues
Extent of applicable codes	P5: Are outside problems encompassed by standards and codes of practice for professional engineering
Extent of stakeholder	P6: Involve diverse groups of stakeholders with widely varying
involvement and conflicting requirements	needs
Interdependence	P7: Are high level problems including many component parts or sub-problems



Table 4.3: Range of Complex Engineering Activities

Attribute	Complex activities means (engineering) activities or projects that have some or all of the following characteristics:
Range of resources	A1: Involve the use of diverse resources (and for this purpose resources include people, money, equipment, materials, information and technologies)
Level of interaction	A2: Require resolution of significant problems arising from interactions between wide-ranging or conflicting technical, engineering or other issues
Innovation	A3: Involve creative use of engineering principles and research-based knowledge in novel ways
Consequences for society and the environment	A4: Have significant consequences in a range of contexts, characterized by difficulty of prediction and mitigation
Familiarity	A5: Can extend beyond previous experiences by applying principles-based approaches

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